STATED MEETING, JUNE 15, 1841.

VICE PRESIDENT MORTON in the Chair.

DONATIONS TO THE LIBRARY.

Encyclopædia Brittanica. 21 vols. 4to.—From Dr. Goddard.

Essai sur les Réfractions Astronomiques dans la zone torride. Par A. de Humboldt. 4to Paris, 1808.—From Dr. Hallowell.

Review of the References to the Hortus Malabaricus of Henry Van Rheede van Draakenstein. By L. W. Dillwyn. 8vo. Swansea, 1839.—From the author.

DONATIONS TO THE MUSEUM.

Rhætezite and large Dodecaedral Garnets, from Lincoln county, N. Carolina.—From Dr. Blanding.

Mineral Charcoal, from the Nesquehoning mine, in contact with Anthracite; and magnetic iron ore with adhering gangue, obtained three miles from Rockaway, Morris county, N. Jersey.—From. Prof. Johnson.

WRITTEN COMMUNICATIONS.—Professor Johnson submitted the result of his experiments "On the relation between the coal of South Wales and that of some Pennsylvania anthracites."

Having received some time since a number of samples of the coals used by Mr. Crane at the Yniscedwyn iron works in South Wales, some pains have been taken to trace the relation of that mineral to some of the many varieties of anthracite found in Pennsylvania. It was the first step in this inquiry to mark the relation

by external characters. These in the Welsh coal are, 1st. A structure often lamellated, and tending to separate on the surfaces of deposition, owing to the quantity of carbonaceous clod which occupies the dull seams between the bright plies of coal.

2d. The abundance and width of the reeds constituting the charcoal deposits.

3d. The shining and polished surfaces occasionally presenting themselves to view at some of the natural partings.

4th. The purplish tints of metallic oxide often observable on the surfaces of fracture.

5th. The general colour is deep black, and either dull or shining according as the ply which is examined belongs to the coal proper, or to the carbonaceous clod partings of the seams.

The next circumstance worthy of attention in tracing the relation of coals, is their specific gravity; and this in the Welsh anthracite is from 1.336 to 1.372, not greater than that of many bituminous coals.

The next circumstance worthy of attention is the quantity of volatile matter, and this by the mean of two trials is 9.18 per cent.; that on the anthracite containing most clod is 10.7, and that of the more compact variety is 7.66 per cent.

Mr. Mushet makes it from 6.66 to 7.80 in the coals of the same locality. Mr. Frazer analyzed a sample of the same coal, and found 7.60 of volatile matter, 86.6 of carbon, and 5.08 of ashes.

The quantity of earthy matter in the Iniscedwyn anthracite, according to the mean of 3 analyses of Mr. Mushet, is 3.578 per cent. Adopting this for the proportion in the sample which yielded 10.7 per cent. of volatile matter, we have the solid carbon = 85.722 per cent. and in the other 88.762.

Among the Pennsylvania anthracite, that which according to the observations of Prof. Johnson approximates most nearly to the Inyscedwyn coal, is the coal of Lyken's valley, situated in the northwestern fork of the southern coal field. This coal has all the exterior characters of the Welsh anthracite; containing in many samples a large portion of carbonaceous clod, with well marked

vegetable impressions; and in colour, structure, and varieties of surface, the two coals might readily be taken the one for the other. Of nine samples analyzed by Prof. Johnson, the lowest specific gravity was found to be 1.374, the highest 1.416, and the mean 1.390. The mean amount of volatile matter was found to be 8.067, the highest being 11.854 per cent.; the mean proportion of earthy matter and metallic oxides is 4.46; and that of the fixed carbon 87.472 per cent.

From these data we derive the following comparisons.

	Sp. Gr.	Vol. mat.	Carbon.	Ashes
Inyscedwyn, lighter variety,	1.336	10.7	85.722	3.578
Do. heavier,	1.372	7.66	88.762	3.578
Mean of two, . =	1.354	9.18	87.242	3.578
Lyken's valley, .	1.390	8.067	87.472	4.460

In distilling the Welsh anthracite, the first portion of gas which comes over, burns with a pale blue flame, like that of carbonic oxide, which is succeeded at a certain point of temperature by a sudden outburst of carburetted hydrogen, burning with a bright flame and some smoke, a quantity of bituminous matter being at the same time evolved; sufficient in one instance to close up the narrow beak of the retort employed in the distillation. The coke is perfectly anthracitous, and the angles of the fragments entirely sharp and well defined.

The gaseous matter of the Lyken's valley anthracite also burns with a brilliant flame, but no violent explosive development of it was remarked.

Professor Johnson made some remarks on the recent application of Anthracite, to the smelting of the magnetic iron ores of New Jersey.

This has been effected at Stanhope, on the line of the Morris canal, 38 miles north-east of Easton, at which one furnace is now

in action; another is nearly completed, a third is partly finished, and the foundations of a fourth are prepared.

The ore used at those furnaces is mined at Irondale, 7 miles eastward of the works, on the line of the canal, and is found to yield in practice 65 per cent. of pig metal of a lively grey colour, soft, and easily wrought, though not remarkably tough. The anthracite hitherto used is that from the Lehigh, chiefly from the middle coal pit, and according to their experience hitherto, a decided preference is given to the Beaver Meadow coal. The hot blast is employed at a temperature of 600 degrees and upwards. The quantity of coal required within the furnace to make one ton of iron is 22 cwt.; that for heating the blast, about 4 cwt. The air is delivered to the furnace under a pressure of 3 lbs. to the square inch. The amount of blast furnished by the engine is 4071 cubic feet per minute; which as the furnace makes 8 tons per day, gives a little more than 25 tons of air urged through the bellows for every ton of iron produced. But the air heating ovens are supposed to receive about one tenth of this amount, and nearly an equal portion is believed to be wasted through apertures in the tubes leading to the engines. If this estimate be correct, the quantity of blast actually delivered to the furnace will be 20 tons per ton of pig metal produced; a quantity corresponding with what has been found necessary both from theory and from experience in other anthracite furnaces.